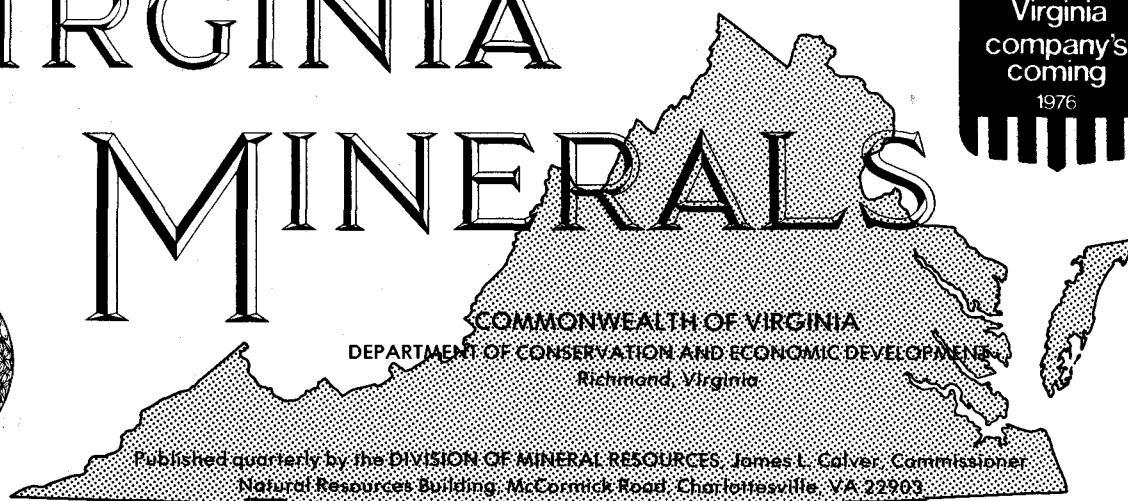


VIRGINIA MINERALS



Vol. 22

February 1976

No. 1

THE MINERAL INDUSTRY OF VIRGINIA IN 1974¹ ADVANCE SUMMARY

Total value of mineral production in Virginia in 1974 was \$1,058.2 million, an increase of \$512.8 million or 94 percent above that of 1973. This was the twelfth consecutive year that mineral values have increased. Of the total mineral value approximately 81 percent was contributed by fuels, 18 percent by nonmetals, and 1 percent by metals.

Production of bituminous coal, the Commonwealth's leading mineral commodity in terms of value, increased 1 percent in output and 127 percent in value. Deep mine production decreased 3 percent and surface mine production increased 9 percent. Natural gas output increased 39 percent in quantity and 114 percent in value. Petroleum output and value increased.

Stone, the second-ranking mineral commodity, increased 1 percent in output and 16 percent in value. Sand and gravel output decreased 1 percent, but value rose 12 percent. Lime production rose 14 percent while the value increased 55 percent. Masonry cement declined in both production and value while portland cement and gypsum both decreased in output, but increased in value. Aplite, clays, kyanite, and soapstone all increased in production and value.

Lead production increased 18 percent and its value increased 63 percent. Zinc production increased 3 percent and its value increased 79 percent.

¹Prepared in Division of Coal—Fuels, U.S. Bureau of Mines, under a cooperative agreement between the Bureau and the Virginia Division of Mineral Resources.

Table 1.—Mineral production in Virginia.¹

Mineral	Quantity	1973	Quantity	1974
		Value (thousands)		Value (thousands)
Clays	thousand short tons	1,646	1,957	\$ 2,614
Coal (bituminous)	do.	33,961	34,326	856,099
Gem stones		NA	NA	13
Lead (recoverable content of ores, etc.)	short tons	2,637	3,106	1,398
Lime	thousand short tons	782	895	18,929
Natural gas	million cubic feet	5,101	7,096	3,619
Petroleum (crude)	thousand 42-gallon barrels	—	3	W
Sand and gravel	thousand short tons	14,511	14,314	29,270
Soapstone	short tons	4,600	W	W
Stone	thousand short tons	43,895	44,176	95,988
Zinc (recoverable content of ores, etc.)	short tons	16,683	17,195	12,346
Value of items that cannot be disclosed:				
Aplite, cement, gypsum, kyanite, and				
values indicated by symbol W				
Total				
	—	235,201	—	37,931
	—	2545,401	—	1,058,207

NA Not available. W Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

¹Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

²Revised from value given in *Virginia Minerals*, vol. 20, no. 4, p. 29, November 1974.

THE MINERAL INDUSTRY OF VIRGINIA IN 1975

PRELIMINARY DATA

Preliminary information shows that the total value of mineral production in Virginia in 1975 was \$1,150,699,000, an increase of \$92,500,000 or 9 percent above that of 1974 according to estimates by the Division of Coal—Fuels, U. S. Bureau of Mines. This was the thirteenth consecutive year that mineral values have increased. Of the total mineral value approximately 86 percent was contributed by fuels, 13 percent by nonmetals, and 1 percent by metals.

The estimated production of bituminous coal increased 2 percent to 35,000,000 tons and output value increased from \$856,099,000 in 1974 to an estimated \$980,000,000 or 14 percent in 1975.

Aplite, cement, clay, gypsum, lime, sand and gravel, and stone all decreased in output and value. Soapstone increased in both output and value.

Lead declined in output and value. Zinc decreased in output, but increased in value.

LIST OF ROAD LOGS OF VIRGINIA GEOLOGY

F. B. Hoffer

The following list contains all road logs of geology in Virginia that are available in the Division of Mineral Resources library. Many of the logs listed in the references are parts of formal publications, others are in various forms of reproduction, and a few consist only of a single typewritten copy. All are available for inspection in the library of the Division at Charlottesville.

The geographic locations of the logs and the references to such areas are included in an index. Where the road log deals with more than three counties, it is entered in the index under regional subdivisions, mainly physiographic provinces, i.e. Coastal Plain or Valley and Ridge.

GEOGRAPHIC LOCATION AND REFERENCE INDEX

ALBEMARLE COUNTY

Southern: Pegau, A. A., 2.

ALLEGHANY COUNTY

Clifton Forge-White Sulphur Springs area: West Virginia Geol. and Econ. Survey, 2.

Rich Patch area: McGuire, O. S.

AMELIA COUNTY

Morefield mine: Pegau, A. A., 3.

AMHERST COUNTY

Cormack, W. B.

ARLINGTON COUNTY

Great Falls area: U. S. Geol. Survey

Washington, D. C. area: Johnston, P. M.

APPALACHIANS

Centerville-Charlottesville-Staunton area: Dietrich, R. V., 1.

Roanoke-Monterey-Harrisonburg area: Lowry, W. D., 1.

Valley and Ridge mostly: Butts, C.

Washington, D. C. to Luray: Stow, M. H.

AUGUSTA COUNTY

Afton-Staunton, north: Appalachian Geol. Soc., 1.

North-central area: Johnson, R. W., 1.

Staunton, Churchillville, Stuarts Draft, and Greenville quadrangles:

Rader, E. K., 1.

Southeastern area, storm-damaged areas: Webb, H. W., 1.

BATH COUNTY

Warm Springs and Nimrod Hall area: West Virginia Geol. and Econ. Survey, 2.

BEDFORD COUNTY

Lynchburg area: Brown, W. R., 1.

BLUE RIDGE

Fancy Gap-Galax area: Cooper, B. N., 6.

Lexington to Buchanan via Blue Ridge Parkway: Spencer, E. W.

Nelson County area: Ciolkosz, E. J.

Northern: Bertrand, K. J.; Dietrich, R. V., 2.

Shenandoah National Park, middle section: Furcron, A. S.

BOTETOURT COUNTY

Blue Ridge Parkway-Eagle Rock area: V.P.I. Dept. Geol. Sci.

Northeast section: Steidtmann, E.

Rt. 220: Cooper, B. N., 2.

Southern: Cooper, B. N., 1.

Sugarloaf Mountain, Buchanan, and Arnold Valley quadrangles:

Webb, H. W., Jr., 2.

Western: McGuire, O. S.

BUCKINGHAM COUNTY

Arvon slate district, Willis Mountain: Brown, W. R., 2.

Arvon-Buckingham Slate Co., Willis Mountain: Espenshade, G. H.

CHESTERFIELD COUNTY

Midlothian area: Goodwin, B. K., 1.

CAMPBELL COUNTY

Lynchburg area: Brown, W. R., 1.

CARROLL COUNTY

Galax area: Rankin, D. W., 2.

CHESTERFIELD COUNTY

Eastern: Pegau, A. A., 3.

COASTAL PLAIN

Chesapeake Bay area: Stephenson, L. W.

Chesapeake-Norfolk-Virginia Beach area: Spencer, R. S.

Lower James River estuary cruise: Nichols, M. M.

- Norfolk area: Virginia Acad. Sci., 1.
 Quantico to Yorktown area: Ruhle, J. L.
 Richmond area: Onuschak, E., Jr.
 2nd Hampton Roads crossing: Meadors, G. S., Jr.
 South of the James River: Moore, W. E.
 Southeastern: Coch, N. K.
 York-James Peninsula, lower: Johnson, G. H., 1.
 Yorktown, Poquoson West, and Poquoson East quadrangles:
 Johnson, G. H., 2.
- FAIRFAX COUNTY**
 Fairfax 15-minute quadrangle: Milton, C.
 Washington, D. C. area: Johnston, P. M.
- FLOYD COUNTY**
 Sears, C. E.
- FLUVANNA COUNTY**
 Arvon slate district: Brown, W. R., 2.
- FRANKLIN COUNTY**
 Philpott Reservoir quadrangle: Conley, J. F., 1.
 Snow Creek quadrangle: Henika, W. S.
 South-central area: Conley, J. F., 2.
- FREDERICK COUNTY**
 M. J. Grove Co. quarries: Bass, C. E.
 Northwest area: Woodward, H. P.
- GILES COUNTY**
 Mountain Lake area: Hall, S. T.; Sears, C. E.
 Narrows area: Cooper, B. N., 7.
 Northwest area: Holden, R. J., 1.
- GOOCHLAND COUNTY**
 Boscobol quarry: Parrott, W. T., 2.
- GRAYSON COUNTY**
 Rankin, D. W., 2.
 Gossan Howard pit: Weinberg, E. L., 2.
 Mount Rogers area: Rankin, D. W., 1.
- GREENE COUNTY**
 Allen, R. M., 1.
 Stanardsville area: Furcron, A. S.
- HENRICO COUNTY**
 Richmond area: Goodwin, B. K., 1.
 Sunnyside granite quarry: Roberts, J. K., 1.
- HENRY COUNTY**
 Northwest to southeast: Conley, J. F., 2.
 Philpott Reservoir quadrangle: Conley, J. F., 1.
 Snow Creek, Martinsville East, Spray, and Price quadrangles:
 Henika, W. S.
- HANOVER COUNTY**
 Royal Stone Co.: Parrott, W. T., 2.
- HIGHLAND COUNTY**
 McDowell area: West Virginia Geol. and Econ. Survey, 2.
- LEE COUNTY**
 Cumberland Gap area: Englund, K. J.
 Southwest section: Ohio Geol. Soc.
- LOUDOUN COUNTY**
 Harpers Ferry area: Appalachian Geol. Soc., 2; Cloos, E.
 Leesburg quadrangle: Toewe, E. C.
- MADISON COUNTY**
 Allen, R. M., 1.
- MONTGOMERY COUNTY**
 Blacksburg area: Hall, S. T.
 Fagg area: V.P.I. Dept. Geol. Sci.
 Radford-Blacksburg area: Sears, C. E.
 Salem synclinorium: Tillman, C. G., 2.
 Southwest area: Holden, R. J., 1.
 Western, overthrust belt: Lowry, W. D., 2.
- NELSON COUNTY**
 Schuyler, Georgia Marble Co.: Espenshade, G. H.
 Storm-damaged areas: Webb, H. W., 1.
 Storm area, landscape evolution: Ellison, R. L.
- NEW KENT COUNTY**
 Western: Goodwin, B. K., 1.
- PAGE COUNTY**
 Allen, R. M., Jr., 2.
 Luray Caverns: McGill, W. M.
- PATRICK COUNTY**
 Northern area: Conley, J. F., 2.
 Philpott Reservoir quadrangle: Conley, J. F., 1.
- PIEDMONT**
 Altavista area: Redden, J. A.
 Boscobol quarry, Black Heath mine, Genito Mills quarry, Rutherford mine: Parrott, W. T.
 Central, Madison to Cumberland counties: Conley, J. F., 3.
 Culpeper Triassic basin: Ellison, R. L.
 Hylas and Midlothian quadrangles: Goodwin, B. K., 2.
 Northeastern, gold-pyrite belt: Sweet, P. C.
 Northern: Dietrich, R. V., 2.
 Orange County, Fairfax quarry, Leesburg, Triassic rocks: Roberts, J. K., 2.
- PITTSYLVANIA COUNTY**
 Danville area: Pegau, A. A., 1.
 White Oak Mountain, Virginia Solite Corp.: Thayer, P. A.
- PRINCE GEORGE COUNTY**
 Rt. 10 and 827: Parrott, W. T., 2.
- RICHMOND (CITY)**
 East end: Roberts, J. K., 1.
- ROANOKE COUNTY**
 Hollins Slide area: V.P.I. Dept. Geol. Sci.
 North-central: Holden, R. J., 2.
 Salem-Catawba area: Cooper, B. N., 1.
 Salem synclinorium: Tillman, C. G., 2.
- ROCKBRIDGE COUNTY**
 Eastern: Cormack, W. B.
 Lexington 15-minute quadrangle: Bick, K. F.
 Natural Bridge, Sugarloaf Mountain, and Arnold Valley quadrangles: Webb, H. W., 2.
 Storm-damaged areas: Webb, H. W.
- ROCKINGHAM COUNTY**
 Betts quarry-Timberville area: Bass, C. E.
 Dale Enterprise area: Johnson, R. W., 1.
 Northwest section: West Virginia Geol. and Econ. Survey, 1.
- SHENANDOAH COUNTY**
 North-south, center: Bass, C. E.
 Southern: Appalachian Geol. Soc., 1.
 Woodstock, Wolf Gap, Conicville, and Edinburg quadrangles:
 Young, R. S.
- SMYTH COUNTY**
 Western: Bartlett, C. S., 2.
- VALLEY AND RIDGE**
 Blacksburg area: Cooper, B. N., 5.
 Clifton Forge-Wytheville area: Appalachian Geol. Soc., 3.
 Lexington to Buchanan via Blue Ridge Parkway: Spencer, E. W.
 Roanoke to Winchester: Cooper, B. N., 4.
 Roanoke Valley: Lowdon, J. A.
 Rt. 11, Winchester to Bristol: Cooper, B. N., 3.
 Salem area: Tillman, C. G.
 West-central: Johnson, R. W., 2.
 Thermal Springs area: Gathright, T. M., II, 1.
 Wytheville-Narrows-Blacksburg area: Cooper, B. N., 6.
- VIRGINIA**
 Northern: Bevan, A. C., 1, 2.
- VIRGINIA BEACH**
 Mears Corner Borrow pit: Virginia Acad. Sci., 2.
- WARREN COUNTY**
 Front Royal quadrangle: Rader, E. K., 2.
- WASHINGTON COUNTY**
 Bristol and Wallace quadrangles: Bartlett, C. S., 1.
- WYTHE COUNTY**
 Austinville mine: Weinberg, E. L., 1, 2.

REFERENCES

ALLEN, R. M.

1. Annual field trip, May 9, 1964, Charlottesville, Virginia: Virginia Acad. Sci., Geol. Sec., 2 p., 1964.
2. Field trip log—Page County: Open-file report, Virginia Division of Mineral Resources, 2 p., 1965.

APPALACHIAN GEOLOGICAL SOCIETY

1. (and Virginia Division of Geology, and West Virginia Geological Survey). Road log, *in* Guidebook, joint field conference in the Harrisonburg area, Virginia, May 19-22, 1955: Appalachian Geol. Soc., Virginia Div. Geology, and West Virginia Geol. Survey, p. 1-13, 1955.
2. (and Pittsburg Geological Society). Road log, *in* The Great Valley in West Virginia—Annual field trip, October 1964: West Virginia Geol. and Econ. Survey, p. 42-64, 1964.
3. Road log, *in* Silurian stratigraphy, central Appalachian basin—Field conference, Roanoke, Virginia, May 17-18, 1970: Appalachian Geol. Soc., p. 121-148, 1970.

BARTLETT, C. S.

1. Familiarization road logs for the Wallace and Bristol, Virginia quadrangles: Open-file report, Virginia Division of Mineral Resources, 1969.
2. (and Webb, H. W.). Road log, *in* Geologic factors of the Bristol and Wallace quadrangles, Washington County, Virginia and anatomy of the Lower Mississippian delta in southwestern Virginia—Fourth annual geology field conference of the Virginia Academy of Science, Geology Section: Emory, Virginia, Emory and Henry College, Field Guide 1, p. 7-22 and 43-50, 1972.

BASS, C. E.

(and others). Annual field trip, May 14, 1955, Harrisonburg, Virginia: Virginia Acad. Sci., Geol. Sec., 3 p., 1955.

BERTRAND, K. J.

Blue Ridge field trip—International Geographical Union, 8th General Assembly and 17th International Congress, Washington, D. C., August 8-15, 1952: Washington, D. C., Natl. Geog. Soc., 25 p., 1952.

BEVAN, A. C.

1. (and others). Northern Virginia: Internat. Geol. Cong., 16th, 1933, Guidebook 11, 43 p., 1933.
2. (and others). Guidebook, Field conference of Pennsylvania geologists, Virginia, 1938: Virginia Geol. Survey, Guide Leaflet no. 1, 44 p., 1938.

BICK, K. F.

Annual field trip, May 1961, Lexington, Virginia: Virginia Acad. Sci., Geol. Sec., 1 p., 1961.

BROWN, W. R.

1. Annual field trip, May 12, 1951, Lynchburg,

Virginia: Virginia Acad. Sci., Geol. Sec., 6 p., 1951.

2. Road log and guide—Geology of the Arvonias slate district, Virginia, May 14, 1966: Washington Pick and Hammer Club Field Trip, 7 p., 1966.

BUTTS, CHARLES

Itinerary, *in* Appalachian region: Internat. Geol. Congress, 16th, 1933, Guidebook 3, p. 25-94, 1932.

CIOLKOSZ, E. J.

(and others). Nelson County tour, *in* Slope stability and denudational processes, central Appalachians: Geol. Soc. Washington, D.C., p. 23-30, 1971.

CLOOS, ERNST

Road log, South Mountain trip, *in* Structural geology of South Mountain and Appalachians in Maryland, Guidebooks 4-5: Johns Hopkins Univ. Studies in Geology 17, p. 21-53, 1958.

COCH, N. K.

(and Oakes, R. Q., Jr.). Post-Miocene stratigraphy and morphology, southeastern Virginia—Friends of the Pleistocene (Eastern Group), 29th annual reunion, Chesapeake, Virginia, 1966: [n.p.] [30] p., 1966.

CONLEY, J. F.

1. (and Henika, W. S.). Field trip road log, Philpott Reservoir quadrangle, Virginia: Open-file report, Virginia Division of Mineral Resources, 7 p., 1969.
2. (and Henika, W. S.). Field trip across the Blue Ridge anticlinorium, Smith River allochthon, and Sauratown Mountains anticlinorium near Martinsville, Virginia: Virginia Minerals, vol. 19, no. 4, p. 37-44, 1973.
3. (and Johnson, S. S.). Road log of the geology from Madison to Cumberland counties in the Piedmont, central Virginia: Virginia Minerals, vol. 21, no. 4, p. 29-38, 1975.

COOPER, B. N.

1. Annual field trip, May 8, 1948, Roanoke, Virginia: Virginia Acad. Sci., Geol. Sec., 12 p., 1948.
2. Field trip, May 13, 1950, Roanoke, Virginia: Virginia Acad. Sci., Geol. Sec., 10 p., 1950.
3. Geological features along U. S. Routes 11, 29, and 250 in Virginia, Pt. I, U. S. Route 11 from West Virginia line to Bristol, *in* Russell, R. J., ed., Guides to southeastern geology: Geol. Soc. America Guidebook, 1955 Ann. Mtg., p. 1-27, 1955.

4. Itinerary of field excursion, *in* The geology of the region between Roanoke and Winchester in the Appalachian Valley of western Virginia: Johns Hopkins Univ. Studies Geology 18, Guidebook 2, p. 31-60, 1960.
5. Field trip log—Blacksburg synclinorium and Pulaski overthrust, *in* Geological excursions in southwestern Virginia—Geological Society of America Southeastern Section, Annual Meeting, 1963: Virginia Polytech. Inst. Eng. Ext. Ser. Geol., Guidebook 2, p. 33-47, 1963.
6. Itinerary—Grand Appalachian field excursion, *in* Geological Guidebook 1: Virginia Polytech. Inst. Eng. Ext. Ser. Geol. Guidebook 1, p. 1-119, 1961.
7. Road log—The Appalachian structural and topographic front between Narrows and Beckley, Virginia and West Virginia, *in* Guidebook to Appalachian tectonics and sulfide mineralization of southwestern Virginia: Virginia Polytech. Inst. and State Univ., Dept. Geol. Sci., Guidebook 5, p. 101-142, 1971.

CORMACK, W. B.

(and Stow, M. H.). Annual field trip, May 9, 1953, Lexington, Virginia: Virginia Acad. Sci., Geol. Sec., 5 p., 1953.

DAVIES, W. E.

Historical engineering geology of the C & O Canal—Field trip 5, *in* Association of Engineering Geologists, 1970 Annual Meeting [Washington, D. C.] [Guidebook to] field trips 1 and 5: [Sacramento, Calif.], Assoc. Eng. Geologists, p. 7-16, 1970.

DIETRICH, R. V.

1. (and Lowry, W. D.). Geological features along U. S. Routes 11, 29, and 250 in Virginia, Pt. II, Washington, D.C. and Point of Rocks, Maryland to Staunton, Virginia, *in* Russell, R. J., Guides to southeastern geology: Geol. Soc. America Guidebook, 1955 Ann. Mtg., p. 28-42, 1955.
2. Southern field excursion guidebook, April 1962—International Mineralogical Association, 3d General Congress, Washington, D.C., 1962: [Washington, D. C., Mineralog. Soc. America], 59 p., 1962.

ELLISON, R. L.

(and others). Virginia Field Conference, [3d], Univ. Virginia, Charlottesville, October 1971: 1 sheet, 1971.

ENGLUND, K. J.

(and Harris, L. D.). Geologic features of the

Cumberland Gap area, Kentucky, Tennessee, and Virginia—Geological Society of Kentucky field trip, 1961: Lexington, Kentucky Geol. Soc., 30 p., 1961.

ESPENSHADE, G. H.

(and Gooch, E. O.). Annual field trip, May 9, 1959, Charlottesville, Virginia: Virginia Acad. Sci., Geol. Sec., 4 p., 1959.

FURCRON, A. S.

Annual field trip, May 8, 1937, Charlottesville, Virginia: Virginia Acad. Sci., Geol. Sec., 2 p., 1937.

GATHRIGHT, T. M., II

Road log to several thermal springs of western Virginia: Open-file report, Virginia Division of Mineral Resources, 1975.

GOODWIN, B. K.

1. (and Johnson, G. H.). Road log, *in* Geology of the upland gravels near Midlothian, Virginia, Pt. 2 of Atlantic Coastal Plain Geological Association Guidebook, 11th Annual Field Conference, 1970: [Norfolk, Virginia], Old Dominion Univ., 35 p., 1970.
2. Road logs—Hylas and Midlothian quadrangles: Open-file report, Virginia Division of Mineral Resources, 20 p., 1971.

HALL, S. T.

Geology field trip, *in* NSS-71 guidebook (Whittemore, R. E., ed.): Region Record, vol. 1, no. 4, p. 131-134, 1971.

HENIKA, W. S.

Field trip road log for the Snow Creek, Martinsville East, Price, and Spray quadrangles, Virginia: Open-file report, Virginia Division of Mineral Resources, 6 p., 1972.

HOLDEN, R. J.

1. Annual field trip, May 7, 1938, Blacksburg, Virginia: Virginia Acad. Sci., Geol. Sec., 3 p., 1938.
2. Annual field trip, May 9, 1942, Roanoke, Virginia: Virginia Acad. Sci., Geol. Sec., 3 p., 1942.

JOHNSON, G. H.

1. (and Goodwin, B. K.). Road log, *in* Guidebook to the geology of the lower York-James Peninsula and south bank of the James River—Atlantic Coastal Plain Geological Association, 10th Annual Field Conference, and First Annual Virginia Geological Field Conference: Williams-

burg, Virginia, College of William and Mary (Dept. Geology Guidebook 1), p. 20-33, [1969].

2. Road log—Geology of the Yorktown, Poquoson West, and Poquoson East quadrangles: Open-file report, Virginia Division of Mineral Resources, 6 p., 1972.

JOHNSON, R. W.

1. (and Milton, Charles). Alkaline complex and related rocks of the central Shenandoah Valley, Augusta and Rockingham counties, Virginia: Virginia Acad. Sci., 13 p., 1966.
2. (and Milton, Charles, and Dennison, J. M.). Field trip to the igneous rocks of Augusta, Rockingham, Highland, and Bath counties, Virginia: Virginia Division of Mineral Resources Information Cir. 16, 68 p., 1971.

JOHNSTON, P. M.

A visitors guide to the geology of the National Capital area—Internat. Mineralog. Assoc., 3d Gen. Mtg., Washington, D. C., 1962: [Washington, D.C., Mineralog. Soc. America], 32 p., 1962.

LOWDON, J. A.

(and Poff, N. O., and Whittaker, Elizabeth). Here's rock—A field guide to the geology of the Roanoke Valley: Roanoke City Public Schools, 225 p., 1972.

LOWRY, W. D.

1. (and others). Road log, *in* Guidebook to contrast in style of deformation of the southern and central Appalachians of Virginia: Virginia Polytech. Inst. and State Univ., Dept. Geol. Sci., Guidebook 6, p. 141-183, 1971.
2. Road log—Appalachian overthrust belt, Montgomery County, southwestern Virginia, *in* Guidebook to Appalachian tectonics and sulfide mineralization of southwestern Virginia: Virginia Polytech Inst. and State Univ., Dept. Geol. Sci., Guidebook 5, p. 167-177, 1971.

MCGILL, W. M.

Luray caverns in Virginia, *in* American Geophysical Union excursion to Luray, Virginia: Washington, D. C., Internat. Union Geodesy and Geophysics, 7th Assembly, p. 11-20, 1939.

MCGUIRE, O. S.

(and Biggs, T. H.). Road log—Eagle Rock, Strom, Oriskany, and Salisbury quadrangles: Open-file report, Virginia Division of Mineral Resources, 16 p., 1973.

MEADORS, G. S., JR.

Field trip to the second Hampton Roads Bridge-Tunnel crossing, 23rd Annual Highway Geology Symposium, 1972: Virginia Dept. Highways and others, 28 p., 1972.

MILTON, CHARLES

(and Chaco, C. T.). Field trip, Fairfax quadrangle, May 17, 1958: Petrologists Club of Washington, D. C., 6 p., 1958.

MOORE, W. E.

Pleistocene terraces south of the James River, Virginia—Virginia Acad. Sci., Geol. Sec., Guidebook, May 1956: Virginia Acad. Sci., [14] p., 1956.

NICHOLS, M. M.

Cruise guide to the James River estuary—Virginia Acad. Sci., 45th Ann. Mtg., May 6, 1967: Virginia Acad. Sci., 6 p., 1967.

NUNAN, W. R.

Road log of the geology of Frederick County, Virginia: Virginia Minerals, vol. 17, no. 2, p. 13-23, 1971.

OHIO GEOLOGICAL SOCIETY

(and others). Cambrian and Ordovician formations in the vicinity of the Cumberland overthrust block of Tennessee and Virginia—Spring field trip, 1965: Columbus, Ohio, Ohio Geol. Soc., 21 p., 1965.

ONUSCHAK, EMIL, JR.

(and Daniels, P. A., II). Environmental geology and stratigraphy of the Richmond area: Virginia Geology Field Conf., 6th Ann., 33 p., 1974.

PARROTT, W. T.

1. (and Young, R. S.). Field trip May 14, 1960, Richmond, Virginia: Virginia Acad. Sci., Geol. Sec., 2 p., 1960.
2. Annual field trip, May 8, 1965, Richmond, Virginia: Virginia Acad. Sci., Geol. Sec., 3 p., 1965.

PEGAU, A. A.

1. Annual field trip, May 6, 1939, Danville, Virginia: Virginia Acad. Sci., Geol. Sec., 3 p., 1939.
2. Annual field trip, May 10, 1947, Charlottesville, Virginia: Virginia Acad. Sci., Geol. Sec., 5 p., 1947.
3. Annual field trip, May 7, 1949, Richmond, Virginia: Virginia Acad. Sci., Geol. Sec., 5 p., 1949.

RADER, E. K.

1. Road logs—Staunton, Churchville, Stuarts Draft, and Greenville quadrangles: *Virginia Minerals*, vol. 15, no. 3, p. 21-28, 1969.
2. (and Biggs, T. H.). Road log, in *Geology of the Front Royal quadrangle, Virginia*: Virginia Division of Mineral Resources Rept. Inv. 40, 91 p., 1975.

RANKIN, D. W.

1. Guide to the geology of the Mt. Rogers area, Virginia, North Carolina, and Tennessee—Field trip guidebook: *Carolina Geol. Soc.*, 49 p., 1967.
2. Road log—Guide to the geology of the Blue Ridge in southwestern Virginia and adjacent North Carolina, in *Guidebook to Appalachian tectonics and sulfide mineralization of southwestern Virginia*: Virginia Polytech. Inst. and State Univ., Dept. Geol. Sci., Guidebook 5, p. 64-86, 1971.

REDDEN, J. A.

Stratigraphy and metamorphism of the Altavista area—Field trip log, in *Geological excursions in southwestern Virginia*—Geol. Soc. America Southeastern Sec., Ann. Mtg., 1963: Virginia Polytech. Inst. Eng. Ext. Ser., Geol. Guidebook 2, p. 87-99, 1963.

ROBERTS, J. K.

1. (and Pegau, A. A., and McGill, W. M.). Annual field trip, May 3, 1941, Richmond, Virginia: *Virginia Acad. Sci., Geol. Sec.*, 4 p., 1941.
2. (and Edmundson, R. S.). Annual field trip, May 8, 1954, Charlottesville, Virginia: *Virginia Acad. Sci., Geol. Sec.*, (Univ. Virginia, Geology Dept. student field trip), 1954.

RUHLE, J. L.

Guidebook to the Coastal Plain of Virginia north of the James River: Virginia Division of Mineral Resources Information Cir. 6, 46 p., 1962.

SEARS, C. E.

Geology field trip, May 10, 1958, Roanoke, Virginia: *Virginia Acad. Sci.*, 5 p., 1958.

SPENCER, E. W.

Guidebook, Second Annual Virginia Geology Field Conference, Lexington, Virginia, 9 p., 1970.

SPENCER, R. S.

Road log, in *Geology of the outer Coastal Plain, southeastern Virginia, Chesapeake-Norfolk-Virginia Beach*, Pt. 1 of *Atlantic Coastal Plain Geol.*

Assoc. Guidebook 11th Ann. Field Conf., 1970: [Norfolk, Va.] Old Dominion Univ., p. 23-32, 1970.

STEIDTMANN, EDWARD

(and Holden, R. J.). Annual field trip, May 4, 1940, Lexington, Virginia: *Virginia Acad. Sci., Geol. Sec.*, 3 p., 1940.

STEPHENSON, L. W.

(and Cooke, C. W., and Mansfield, W. C.). Itinerary, in *Chesapeake Bay region*: *Internat. Geol. Cong.*, 16th, Guidebook 5, 1933, p. 14-49, 1932.

STOW, M. H.

Description of points of scenic, historic, and geologic interest between Washington, D. C. and Luray, Virginia, in *American Geophysical Union excursion to Luray, Virginia*: *Internat. Union Geodesy and Geophysics*, 7th Assembly, p. 7-10, 1939.

SWEET, P. C.

Road log to some abandoned gold mines of the gold-pyrite belt, northeastern Virginia: *Virginia Minerals*, vol. 21, no. 1, p. 1-9, 1975.

THAYER, P. A.

(and Kirstein, D. S., and Ingram, R. L.). Stratigraphy, sedimentology, and economic geology of Dan River basin, North Carolina—Field trip guidebook, *Carolina Geol. Soc.*, Oct. 24-25, 1970: Raleigh, N.C., *Carolina Geol. Soc.*, 44 p., 1970.

TILLMAN, C. G.

1. Late Silurian(?) and Early Devonian positive area, Salem syncline—Field trip log, in *Geological excursions in southwestern Virginia*—Geol. Soc. America Southeastern Sec., Ann. Mtg., 1963: Virginia Polytech. Inst. Eng. Ext. Ser. Geol., Guidebook 2, p. 59-76, 1963.
2. (and Lowry, W. D.). Structure and Paleozoic history of the Salem synclinorium, southwestern Virginia—*Virginia Acad. Sci., Geology Sec. Field Trip*, Roanoke, Virginia, 1968: Virginia Polytech. Inst. Dept. Geol. Sci., Geol. Guidebook 3, 22 p., 1968.

TOEWE, E. C.

Road log, Leesburg quadrangle, Virginia: Open-file report, Virginia Division of Mineral Resources, 6 p., 1965.

U. S. GEOLOGICAL SURVEY

(and U. S. National Park Service). The river and the rocks—The geologic story of Great Falls and the Potomac River gorge: Washington, D.C., U.S. Govt. Printing Office, 46 p., 1970.

VIRGINIA ACADEMY OF SCIENCE

1. Guidebook for field trips, Norfolk meeting, May 11-12, 1962. Prepared for the fortieth annual meeting; Wyman Harrison, editor: [Norfolk] College of William and Mary, 100 p., 1962.
2. Pleistocene field trip, 45th Ann. Mtg., May 5, 1967: Virginia Acad. Sci., [Geol. Sec.], 1 p., 1967.

VIRGINIA POLYTECHNIC INSTITUTE, DEPARTMENT OF GEOLOGICAL SCIENCES.

Geology field trip, October 5, 1969, Seismological Society of America, Southeastern Section: [Blacksburg, Virginia Polytech. Inst., Dept. Geol. Sci.], Guidebook 4, 8 p., 1969.

WEBB, H. W., JR.

1. (and Nunan, W. E., and Penley, H. M.). Road log—Storm damaged areas in central Virginia: Virginia Minerals, vol. 16, no. 1, p. 1-11, 1970.
2. (and Wunder, J. M.). Familiarization road log to the geology of the Natural Bridge, Sugarloaf Mountain, Buchanan, and Arnold Valley 7.5-minute topographic quadrangles: Open-file report, Virginia Division of Mineral Resources, 20 p., 1973.

WEINBERG, E. L.

1. Geology of the Austinville-Ivanhoe mine area,

in Geological excursions in southwestern Virginia—Geol. Soc. America Southeastern Sec., Ann. Mtg., 1963: Virginia Polytech. Inst. Eng. Ext. Ser. Geol. Guidebook 2, p. 8-17, 1963.

2. (and Craig, J. R., and others). Road log—Field trip to Austinville and the Great Gossan Lead, in Guidebook to Appalachian tectonics and sulfide mineralization of southwestern Virginia: Virginia Polytech. Inst. and State Univ., Dept. Geol. Sci., Guidebook 5, p. 35-38, 1971.

WEST VIRGINIA GEOLOGICAL AND ECONOMIC SURVEY

1. Log of field trip, May 17-18, 1952—Joint meeting Appalachian Geological Society and Engineers' Society of Western Pennsylvania, Oil and Gas Section: Morgantown, W. Va., West Virginia Geol. and Econ. Survey, 29 p., 1952.
2. Log of Appalachian Geological Society field trip June 20-21, 1953: Morgantown, W. Va., West Virginia Geol. and Econ. Survey, 27 p., 1953.

WOODWARD, H. P.

Road log, in Guidebook, joint meeting, Cacapon Lodge - Cacapon State Park, Berkeley Springs, West Virginia, October 9-10, 1959: Appalachian Geol. Soc. and Pittsburg Geol. Soc., p. 16-26, 1959.

YOUNG, R. S.

(and Rader, E. K.). Road log, in Geology of the Woodstock, Wolf Gap, Conicville, and Edinburg quadrangles, Virginia: Virginia Division of Mineral Resources Rept. Inv. 25, p. 55-63, 1974.

✕

✕

✕

✕

✕

ADDITIONS TO STAFF

Mr. Carl R. Berquist, Jr. joined the Division staff on July 15, 1975 and will assist in the various activities of the Piedmont geologic-mapping section. He received his B.E. degree in computer science from Vanderbilt University in 1969 and his M.S. degree in geology from Vanderbilt in 1970. The next three years were spent in the U.S. Navy, with a tour of duty in Alaska. From 1973 to 1975 he studied geology at Florida State University.

Mr. John D. Marr, Jr. joined the Division staff on August 1, 1975 and will assist in the Piedmont geologic-mapping section. He received his B.A. degree in

geology from Appalachian State University in 1972 and his M.S. degree in geology from the University of New Orleans in 1975. Previously he has been employed by the North Carolina Department of Natural and Economic Resources as a contract geologist.

Mr. James A. Henderson, Jr. was employed by the Division on October 16, 1975 as a fuels geologist. He received his B.S. degree in geology from East Tennessee State University in 1971 and his M.S. degree in geology from Purdue University in 1973. He worked for two years as a research earth scientist at the Laboratory for Applications of Remote Sensing at Purdue University.

NEW PUBLICATION

Bulletin 85. DESCRIPTIONS OF VIRGINIA CAVES, by John R. Holsinger; 450 p., 7 maps in pocket, 155 figs., 2 tables. Price: \$8.00 (plus 4 percent State sales tax to Virginia addressees).

A total of 2,319 natural caves have been recorded from Virginia; and all but 10 of them are west of the Blue Ridge mountains. The limestone or solution caves are in the western and southwestern parts of the state in carbonate rocks ranging in age from Lower Cambrian to Upper Mississippian. These caves are located in the Valley and Ridge and Appalachian Plateaus physiographic provinces, but the majority are in the former province.

Since 1962, 680 caves have been discovered in the state, principally in the southwestern counties. Descriptive data on these new caves, along with additional data on 501 previously reported caves, are given. Detailed maps accompany 148 of the cave descriptions. A completely revised listing of all caves in the state, arranged

alphabetically by county, is given for the first time. A total of 213 caves have measured lengths of 1,000 feet or more and 30 of these have surveyed lengths of over 6,561 feet. Other caves vary in length from very small (ca. 25 feet) to around 900 feet.

About 42 percent of the larger caves are formed in limestones of the Middle Ordovician Series, but a significant number of large caves are also in Cambrian, Silurian, Devonian, and Mississippian limestones. The majority of large caves are in limestone, although a number occur in dolomite. Most of the caves in the state are developed in folded rocks that vary in dip from very low to nearly vertical. Development of cave passages is primarily joint controlled, and passages usually extend horizontally despite the structure of the bedding.

Karst topography is well developed in many of the limestone areas of Virginia and consists principally of sinkholes, karren, and subsurface drainage. Extensive subterranean drainage systems, involving cave passages that carry underground streams for several miles, are found in several karst areas of the state.

✕

✕

✕

✕

✕

SILVER IN VIRGINIA

Palmer C. Sweet

Although discovered earlier, silver was probably not commercially recovered in Virginia until the 1880's. It has been mined as a by-product from lead-zinc deposits where the silver may occur in galena in the form of minute inclusions of argentite or other silver minerals such as tetrahedrite and tennantite. In zinc deposits with very little galena, silver can be associated with sphalerite as inclusions of tetrahedrite or tennantite. Silver has also been produced as a by-product from copper and pyritic copper ores, with the silver probably incorporated in chalcopryrite, bornite, or chalcocite. Copper-silver minerals may also be present (Luttrell and Stansfield, 1968, p. 427). In 1935, silver was produced in Virginia as a by-product from lead-zinc and copper mines (Pardee and Park, 1948, p. 30). Silver may also be naturally alloyed with gold; Pardee and Park (1948, p. 29) report that the gold produced in the southern Piedmont region of the United States commonly contains about 10 percent silver. Native silver is reported to occur in small amounts as a thin film in small fractures in sulphide ores in many of the mines in the Virgilina District (Laney, p. 82). The following 40 mines (all abandoned except the Austinville) report the presence of silver in varying

amounts, from a trace in assay to actual reported mine production:

<i>Mine</i>	<i>County</i>	<i>Reference</i>
Allah Cooper	Louisa	Grosh, 1948, p. 2
Arminius	Louisa	Watson, 1907, p. 200
Austinville	Wythe	Currier, 1935, p. 76
Barnes	Charlotte	Laney, 1917, p. 145
Betty Baker	Carroll	Kline, 1949, p. 9
Boyd Smith	Louisa	Luttrell, 1966, p. 24
Brinton	Floyd	Fontaine, 1883, p. 190
Brush Creek	Floyd and Montgomery	Dietrich, 1959, p. 135-136
Buckingham	Buckingham	Luttrell, 1966, p. 27
Cabin Branch	Prince William	U.S.G.S., 1909, p. 547
Dickey, G. S.	Cumberland	Taber, 1913, p. 61
Faber	Albemarle	Roberts, 1942, p. 550
Falling Cliff Zinc	Wythe	Roberts, 1942, p. 214
Franklin	Fauquier	Sweet, 1975, p. 8
Gooney-Manor	Warren	Luttrell, 1966, p. 54
Hemmer	Louisa	Luttrell, 1966, p. 62
High Hill	Halifax	Weed, 1911, p. 87
Hudgins	Buckingham	Luttrell, 1966, p. 68
Hunter	Louisa	Luttrell, 1966, p. 69
Johnson	Buckingham	Watson, 1907, p. 501
Kay	Halifax	Laney, 1917, p. 148
London & Virginia	Buckingham	Taber, 1913, p. 190
Marva	Spotsylvania	Luttrell, 1966, p. 92
Melville	Orange	U.S.B.M., 1936, p. 289
Moss	Goochland	U.S.B.M., 1932-33, p. 150
Page	Fluvanna	Taber, 1913, p. 215
Partridge	Orange	U.S.G.S., 1921, p. 13
Powhatan-Williams	Floyd	Fontaine, 1883, p. 191

Red Bank (Goldbank)	Halifax	U.S.B.M., 1941, p. 330
Roney	Spotsylvania	Luttrell, 1966, p. 112
Ruth placer	Goochland	U.S.B.M., 1942, p. 360
Snead	Fluvanna	Taber, 1913, p. 181
Sulphur	Louisa	Luttrell, 1966, p. 125
Tellurium	Fluvanna and Goochland	Taber, 1913, p. 161
Toncræ	Floyd	U.S.B.M., 1945, p. 354
Twin Vein	Louisa	U.S.B.M., 1925, p. 6
United States	Spotsylvania	Roberts, 1942, p. 561
Valzinco	Spotsylvania	U.S.B.M., 1943, p. 345
Vaulcluse	Orange	U.S.B.M., 1936, p. 289
Young American	Goochland	U.S.G.S., 1911, p. 888

NOTE: Silver has been reported to occur as small wires with prehnite in a vein in the diabase quarry of Fairfax Quarries, Inc., west of Centreville, Virginia, and from unspecified localities in Carroll, Giles, Grayson, Montgomery, Patrick, Pulaski, Roanoke, Spotsylvania, Stafford, and Wise counties (Dietrich, 1970, p. 253-254; Roberts, 1942, p. 620-621).

During the early 1900's, copper ores of the Virgilina District, the concentrates of which were sent to Norfolk or New York for smelting, carried about 6 to 10 ounces of silver per ton (Weed, 1902, p. 80-81). Watson (1907, p. 565) reports that approximately 18,775 fine ounces of silver produced from 1900-1905 were recovered from copper ores. Most likely this copper production was from the High Hill and other copper mines and prospects in Halifax County in the Virgilina District. Virginia Copper Company's High Hill mine had produced 2,485 ounces of refined silver up to March, 1904 (Weed, 1911, p. 87). This early 1900's production plus the by-product silver produced from lead-zinc mines during 1943-44 accounts for more than half of the total silver production in Virginia.

Table 2. — Silver production in Virginia.

(Data from editions of "Mineral Resources of the United States" by the U. S. Geological Survey (1882-1923) and U. S. Bureau of Mines (1924-31); "Minerals Yearbook" by the U. S. Bureau of Mines (1932-61); Roberts, p. 440-441; and Watson, p. 565.)

Year	Ounces	Mine			
1885	Production combined with other states		1911	200 fine oz.	Young American mine, Goochland Co.
1886	Production combined with other states		1912	982 fine oz.	Cabin Branch mine, Prince William Co.
1887	Production combined with other states		1913	960 fine oz.	Cabin Branch mine, Prince William Co.
1888	Production combined with other states		1914	1,458 fine oz.	Cabin Branch mine, Prince William Co.
1889	10 fine oz.		1916	783 fine oz.	Virgilina District copper mines
1891	Production combined with other states		1917	4,518 fine oz.	Virgilina District gold and copper mines, Allah Cooper mine, Louisa Co.; Valzinco mine, Spotsylvania Co.
1892	Production combined with other states		1918	1,814 fine oz.	
1893	Production combined with other states		1921	8 fine oz.	Louisa and Orange Co. gold mines and prospects, Partridge mine, Orange Co.
1894	17 fine oz.		1922	6 fine oz.	Louisa and Orange Co. gold mines and prospects
1895	Production combined with other states		1924	3 fine oz.	
1899	Production combined with other states		1925	5 fine oz.	Twin Vein mine, Louisa Co.
1900	96 fine oz.		1932	8 fine oz.	Moss mine, Goochland Co.
1901	1,044 fine oz.		1934	103 fine oz.	Floyd and Louisa county placers
1902	5,900 fine oz.		1935	55 fine oz.	Melville and Vaulcluse mines, Orange Co.
1903	17,073 fine oz.	High Hill mine, Halifax Co.	1936	96 troy oz.	
1904	6,700 fine oz.	High Hill mine, Halifax Co.	1937	111 troy oz.	
1905	200 fine oz.		1938	502 troy oz.	
1906	250 fine oz.	Red Bank (Goldbank) mine, Halifax Co.	1939	1,780 troy oz.	Floyd Co. placers
1907	221 fine oz.		1940	271 troy oz.	London and Va. mine, Buckingham Co. Red Bank mine, Halifax Co., Valzinco mine, Spotsylvania Co., Ruth placer, Goochland Co.
1908	236 fine oz.		1941	135 troy oz.	
1909	6,400 fine oz.	Cabin Branch mine, Prince William Co.	1942	1,793 troy oz.	
1910	200 fine oz.	Louisa Co. pyrite mines	1943	14,947 troy oz.	
			1944	18,993 troy oz.	
			1945	1,300 troy oz.	

NOTE: Silver production of 11,300 ounces as reported for the years 1953-59 in annual editions of the "Minerals Yearbook" was present only in assay and was not recovered.

REFERENCES

- Currier, L. W., 1935, Zinc and lead region of southwestern Virginia: Virginia Geol. Survey Bull. 43, 122 p.
- Dietrich, R. V., 1959, Geology and mineral resources of Floyd County of the Blue Ridge upland, southwestern Virginia: Virginia Polytech. Inst. Bull. 134, Eng. Expt. Sta. Ser., 160 p.
- Fontaine, W. M., 1883, Notes on the geology and mineral resources of the Floyd, Virginia, Plateau: The Virginias, vol. IV, p. 167-192.
- _____, 1970, Minerals of Virginia: Virginia Polytech. Inst. Bull. 47, Research Division, 319 p.

- Grosh, W. A., 1948, Investigation of the Allah Cooper lead-zinc mine, Louisa County, Virginia: U. S. Bur. Mines Rept. Inv. 4604, 6 p.
- Kline, M. H., and Ballard, T. J., 1949, Investigation of the Great Gosan Lead, Carroll County, Virginia: U. S. Bur. Mines Rept. Inv. 4532, 39 p.
- Laney, F. B., 1917, The geology and ore deposits of the Virgilina district of Virginia and North Carolina: Virginia Geol. Survey Bull. 14, 176 p.
- Luttrell, G. W. and Stansfield, R. G., 1968, Silver: U. S. Geol. Survey Prof. Paper 580, p. 426-430.
- Luttrell, G. W., 1966, Base- and precious-metal and related ore deposits of Virginia: Virginia Division of Mineral Resources, Mineral Resources Report 7, 164 p.
- Pardee, J. T., and Park, C. F., 1948, Gold deposits of the southern Piedmont: U. S. Geol. Survey Prof. Paper 213, 152 p.
- Roberts, J. K., 1942, Annotated geological bibliography of Virginia: Charlottesville, Virginia, The Dietz Press, 693 p.
- Sweet, P. C. 1975, Road log to some abandoned gold mines of the gold-pyrite belt, northeastern Virginia: Virginia Minerals, vol. 21, p. 1-9.
- Taber, Stephen, 1913, Geology of the gold belt in the James River basin, Virginia: Virginia Geol. Survey Bull. 7, 271 p.
- U. S. Bureau of Mines, 1924-31 Mineral resources of the United States: (annual volumes for the years indicated.)
- _____ 1932-61, Minerals Yearbook: (annual volumes for the years indicated.)
- U. S. Geological Survey, 1882-1923, Mineral resources of the United States: (annual volumes for the years indicated.)
- Watson, T.L., 1907, Gold and silver in Mineral resources in Virginia: Lynchburg, Virginia, J. P. Bell Company, p. 549-567.
- Weed, W. H., 1902, Recent development of southern copper deposits in Engineering and Mineral Journal, vol. 74, p. 80-81.
- _____ 1911, Copper deposits of the Appalachian states: U. S. Geol. Survey Bull. 455, 166 p.

x

x

x

x

x

YOUR HOUSE COMES OUT OF A MINE¹

F. T. Davis²

The raw material for the majority of the material used in building your home was furnished by the mining industry.

The foundation is probably concrete (limestone, clay, shale, gypsum, and aggregate mining).

The exterior walls may be made of brick (clay mining) or stone (dimension stone mining).

The insulation in the walls may be glass wool (silica, feldspar, and trona mining) or expanded vermiculite (vermiculite mining).

The interior walls are usually wallboard (gypsum mining).

The lumber in the structure will be fastened with nails and screws (iron ore mining and zinc mining).

If the roof is covered with asphalt shingles, the filler in the shingles is from a variety of colored silicate minerals from mining.

Your fireplace is probably of brick or stone, lined with a steel box (iron ore mining).

Your sewer piping is made of clay or iron pipe (clay mining or iron ore mining). Your water pipe is of iron

or copper pipe (iron ore mining and copper mining).

Your electrical wiring is of copper or aluminum (copper mining or bauxite mining).

Your sanitary facilities are made of porcelain (clay mining).

Your plumbing fixtures are made of brass (copper and zinc mining), or stainless steel (nickel and chrome mining).

Your gutters of galvanized steel (iron ore mining and zinc mining).

The paint is manufactured with mineral fillers and pigments (from minerals obtained by mining).

Your windows are made of glass (trona, silica and feldspar mining).

Your door knobs, locks, and hinges are of brass or steel (copper, zinc, and iron ore mining).

And finally your mortgage is written on paper made from wood or cloth fibers, but fibers filled with clay (from clay mining).

¹Reprinted from *Mining Engineering*, January 1976.

²Society of Mining Engineers, Western Regional Vice President.

Virginia Division of Mineral Resources

Box 3667




Charlottesville, VA 22903

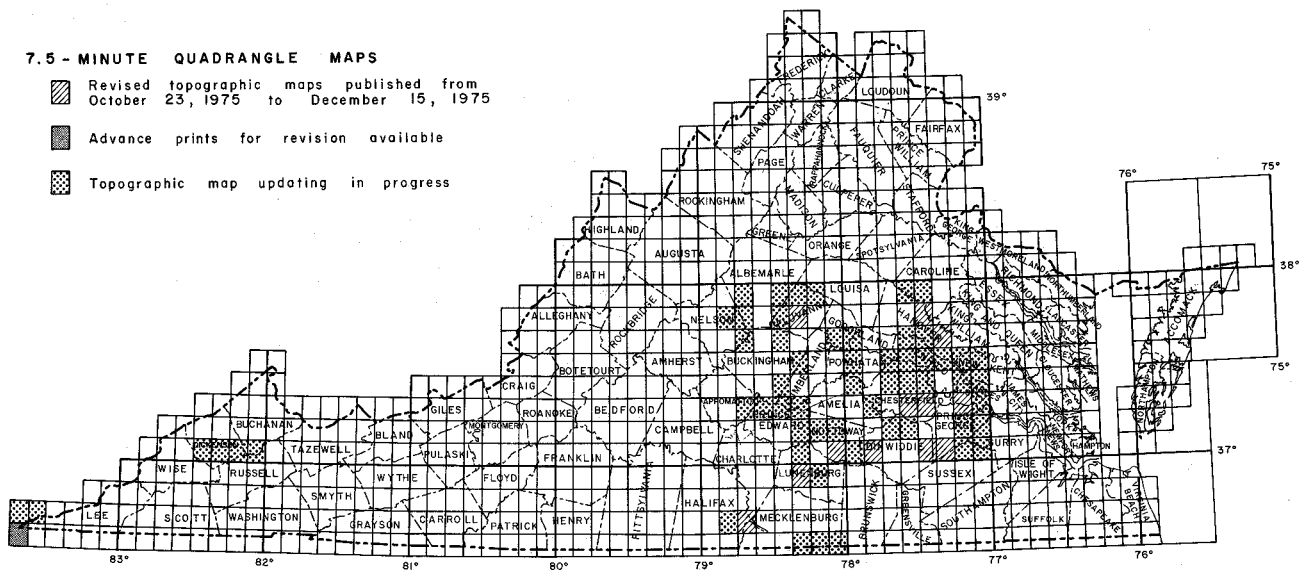
Second-class postage paid at
Charlottesville, Virginia.

Return Postage Guaranteed

TOPOGRAPHIC MAPS

7.5 - MINUTE QUADRANGLE MAPS

-  Revised topographic maps published from October 23, 1975 to December 15, 1975
-  Advance prints for revision available
-  Topographic map updating in progress



Revised 7.5-minute quadrangle maps published from October 23 to December 15, 1975:

Photorevised Maps

Ashland
Beach
Blackstone West
Buffalo Springs
Carson
Chester

Darvills
Lunenburg
Palmyra
Studley
Templeton
Westover

Advance Print for Revision
Middlesboro West

ADVANCE PRINTS

Advance prints are available at 75 cents each from the Eastern Mapping Center, Topographic Division, U. S. Geological Survey, Reston, Virginia 22092.

PUBLISHED TOPOGRAPHIC MAPS

Total State coverage completed; index is available free. Updated photorevised maps, on which recent cultural changes are indicated, are now available for certain areas of industrial, residential, or commercial growth. Published maps for all of Virginia are available at 75 cents each (plus 4 percent State sales tax for Virginia residents) from the Virginia Division of Mineral Resources, Box 3667, Charlottesville, Virginia 22903.

Virginia Minerals Vo. 22, No. 1, February 1976